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## Navy SG Applauds NAMRU-SA Work in Translational Research

Story by Flisa Stevenson, NAMRU-San Antonio Public Affairs



Vice Adm. Matthew L. Nathan, Navy surgeon general and chief of the U.S. Navy Bureau of Medicine and Surgery (front, left) examines the new chairside amalgam filter developed by NAMRU-SA to remove up to 96.67 percent of amalgam waste from dental wastewater. Principal investigator, Dr. Amber Nagy (front, right) explains that the new amalgam filter is available for use across all services. (Photo taken by Flisa Stevenson, NAMRU-SA Public Affairs)

SAN ANTONIO – The Navy surgeon general and hospital corps force master chief (FORCM) visited the Naval Medical Research Unit-San Antonio (NAMRU-SA) facilities, March 30.

Vice Adm. Matthew L. Nathan, Navy surgeon general and chief, U.S. Navy Bureau of Medicine and Surgery, and FORCM Sherman Boss received an overview of current projects while touring NAMRU-SA research laboratories.

“This facility is marked by passion. I am amazed by the science, but I am impressed with your passion,” said Nathan. “You do the full spectrum of research here, from the microbial and sub-cellular all the way up to physical trauma ... you are changing lives.”

Researchers discussed novel advances in wound healing research, infection control, hemorrhage control and resuscitation, and mercury abatement

(continued on page 3)

## NMRC Commanding Officer's Message



Each month there is always more subjects to discuss than room in the newsletter. Doris Ryan, our Public Affairs Officer, saw an excellent editorial in Aviation Week Magazine about the need for the DoD research laboratories to work more effectively with industry partners to meet the needs of the warfighter. The editorial focused on weapons systems, but the message was important for medical research as well. In this issue I had intended to highlight the excellent job the Office of Partnerships and Business Development is doing with each of our commands in improving the processes for setting up agreements with industry, academia, and other government organizations. Those agreements are only necessary when we have pertinent projects being conducted by our cutting-edge researchers. We depend on our Science Directors and other research leaders to help clearly identify fleet requirements and keep us aligned with the direction of civilian innovation and the needs in global health and to maintain those critical relationships with stakeholders outside of DoD.

As I started writing examples of our science leaders across the enterprise, I realized I was prominently listing Dr. Moustafa Mansour our long-time Science Director and Advisor at NAMRU-3 in Egypt, but I was doing it the month after he retired. With tremendous embarrassment, I realized I had not taken the time to acknowledge and thank him. Please let me correct that now. Dr. Moustafa Mansour has been the face of NAMRU-3 for longer than anyone currently involved in Navy Medical Research. He served critical roles as a bench and field researcher, Deputy Science Director, Science Director, and Principal Scientific Advisor to the Commanding Officer. He helped guide us through periods of war and revolution, epidemics and disasters, and dramatic changes in funding, technology, and regulations. Throughout every challenge, he has been a calm voice of wisdom, carefully nurturing relationships across governments and international organizations, and identifying needs and opportunities in medical research and global health. Dr. Moustafa, we all thank you for decades of service to NAMRU-3, Navy Medical Research and Development, and both the Arab Republic of Egypt and the United States of America.

NMRC Commanding Officer sends,  
John. W. Sanders III, CAPT, MC, USN

## NAMRU-Dayton Commanding Officer's Message

The end of a brutal winter brings a vibrant spring season reflected in the positive energy across our command. NAMRU-D is full of life as we enter the "storming" phase after 4.5 years of "forming" and "norming" the newest command in the Navy Medicine R&D enterprise. It is an honor and privilege to lead top professionals in scientific efforts that have fleet relevance and ultimately maximize warfighter survivability and increase operational readiness. Nothing is more rewarding and meaningful than our efforts making it all the way to application in operational systems used by our warfighters.

We maintain close working relationships with fleet stakeholders and R&D transition customers. Our Aeromedical Directorate's initiatives focus on the Commander, Naval Air Forces "Top 10" aeromedical concerns including mitigation of pilot spatial disorientation (SD), fatigue, hypoxia, motion sickness, and threats to visual systems and performance. Our researchers collaborate with NAVAIR PMA-205 Training Systems and the Navy Medicine Operational Training Center detachments of NAMI and NSTI. Examples include the development and validation of simulator-based training scenarios to teach aviators to recognize, avoid, and/or recover from SD, the leading factor of Class A mishaps. These NAVAIR-funded scenarios transitioned to the Aviation Survival Training Centers where the Naval Aviation Survival Training Program is executed and warfighters are trained.



Other aeromedical research includes cutting edge hypoxia mitigation, fatigue countermeasures, identification of improved color vision tests for screening of naval aviators, LASER Eye Protection to mitigate veiling glare and effects of high-power laser pointers, and a pharmaceutical countermeasure for motion sickness. Our Toxicology Directorate completed landmark research in female submariner health effects, and continues work on neurotoxicity and biomarkers of various jet fuels and the hazards of exposure to sand and burn pits in operational environments. Future efforts will have significant impact on fleet operational readiness, exposure levels and safety standards, and aircrew performance and survivability. As we expand our capabilities remember the tremendous opportunity and awesome responsibility of serving those in harms' way. My sincere appreciation and utmost respect to all who are dedicated to protecting and improving our joint warfighters....One team, One fight!

NAMRU-Dayton Commanding Officer sends,  
Jeffrey M. Andrews, CAPT, MSC, USN



(continued from page 1)



Vice Adm. Matthew L. Nathan, Navy surgeon general and chief of the U.S. Navy Bureau of Medicine and Surgery (left) is shown the novel portable ozone sterilizer developed by NAMRU-SA's biomedical engineering team. Post-doctoral Fellow, Dr. Luis Martinez (right) explains the unique features of the prototype. (Photo taken by Flisa Stevenson, NAMRU-SA Public Affairs)

for Navy dental waste surveillance.

Nathan called NAMRU-SA's development of a field portable ozone sterilizer "a game changer." The prototype offers an alternative method of sterilization requiring no consumable chemicals and runs on batteries, negating the need for electrical power.

The biomedical engineering team demonstrated a custom electrospinning device producing a biocompatible nanofiber to

enhance wound treatment. The biocompatible nanofiber scaffold is designed to promote tissue repair by forming a surface, which mimics the natural cellular environment while simultaneously releasing bioactive molecules, to accelerate and potentially minimize the formation of scar tissue.

The environmental surveillance team showcased the mercury abatement work and the development of an EPA compliant separation system for Navy dental waste surveillance. The new chairside amalgam filter developed

by NAMRU-SA removes up to 96.67 percent of amalgam waste from dental wastewater and is available for use across all services as an effective means to minimize mercury in the wastewater stream.

Nathan also toured the world-class Tri-Services Research Laboratory to learn more about research in the evaluation of interventions to stem and control hemorrhage and provide resuscitation.

During an all-hands call, Nathan acknowledged the important and passionate work being done at NAMRU-SA in translational science.

"I consider research vital to our operation and I want to thank you for all the life-saving work you do here at NAMRU-SA," said Nathan. "It is because of you and the work that you do, the [warfighter] survival rate has increased."

Nathan expressed his gratitude for the work conducted at NAMRU-SA by saying, "I want to thank everyone for being 'ambassadors of Navy Medicine' and [for] transformative, translational science. The significant research conducted here translates to lives saved and not just across the battlefield."

NAMRU-SA's vision is to establish the laboratory as the premier provider of innovative, translational research that optimizes warfighter readiness and saves lives.

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Graphic illustration by Mikelle D. Smith, Naval Medical Research Center Public Affairs



# NAMRU-3 Senior Research Advisor Retires

Story courtesy of NAMRU-3 Public Affairs



*Dr. Moustafa Mansour, the leading scientist at the U.S. Naval Medical Research Unit No. 3, retired in March 2015. (Photo courtesy of NAMRU-3 Public Affairs)*

CAIRO - Dr. Moustafa Mansour, the leading American/Egyptian scientist at the U.S. Naval Medical Research Unit No. 3 (NAMRU-3), retired in March 2015. His distinguished career in public health and infectious disease research at NAMRU-3 has spanned over 40 years.

A dedicated scientist and administrator, Mansour served as the principal liaison between NAMRU-3 and the Egyptian Government for more than 20 years. In recent years, he also served as a special advisor to the commanding officer on U.S. military and Department of State research projects.

“NAMRU-3 has been very fortunate for many years to have had a scientist,” said Capt. John Gilstad, commanding officer, NAMRU-3. “The stature of Dr Moustafa with us. Our scientific programs and our partnership with the Ministry of Health have benefited immensely.”

Mansour received a Bachelor of Science

degree in Chemistry and a Master of Science degree in Physical Sciences from the American University in Cairo in the sixties. He then changed his field of interest at Vanderbilt University Medical School in Nashville, Tennessee, where he obtained his Ph.D. degree in Nutritional Biochemistry in 1972.

Following a post-doctoral year at Vanderbilt, he returned to Egypt to work at NAMRU-3 as Head of the Biochemistry Department. With a major, multimillion dollar grant from the National Institutes of Health, he led a team to study nutritional anemia and trace metal deficiencies in the populations of Egypt and other countries in the region.

In 1985, he was appointed Head of the Basic Sciences Division at NAMRU-3, where he directed and managed multidisciplinary programs encompassing basic laboratory research in infectious diseases and public health problems in the region. Among other research efforts, Moustafa, serving as a member of the National

Supreme Committee for Eradication of Schistosomiasis and other Parasitic Diseases co-chaired by the Minister of Health and the Minister of Scientific Research of Egypt, led a multimillion dollar grant by United States Agency for International Development (USAID) to conduct basic studies on schistosomiasis and its associated diseases in Egypt.

He also served on the International Advisory Board for the Schistosomiasis Vaccine Development Project, sponsored by USAID and the World Health Organization. He later served as principal investigator for a major Military Infectious Disease Research Program work unit to study the pathogenic mechanisms of infectious agents of military importance in the Middle East.

In 1990, Mansour was appointed as Special Assistant to the Commanding Officer for Host Country Scientific Affairs, playing a key role in maintaining the relationship between

*(continued on page 8)*



## NMRC Welcomes Egyptian Delegation

Story by Mikelle D. Smith, Naval Medical Research Center Public Affairs



Naval Medical Research Center (NMRC) Operational and Undersea Medicine Directorate (OUMD) Head Dr. Stephen Ahlers (left), gives a tour of the hyperbaric chambers and blast tube area to Egyptian delegates visiting, March 24. (Photo taken by Mikelle D. Smith, Naval Medical Research Center Public Affairs)

SILVER SPRING, Md., -- Naval Medical Research Center (NMRC) leadership and directorate heads welcomed four Egyptian military personnel for a tour, March 24.

Commanding Officer Capt. John W. Sanders greeted the Dean of Egyptian Armed Forces College of Medicine, Major General Khaled Amer, along with three Egyptian military servicemembers, beginning the day's events with freshly brewed hot tea, an Egyptian tradition.

A tour, led by NMRC directorate and department heads was given to the delegates during their visit. On the tour they had the opportunity to meet with NMRC's Infectious Diseases Directorate (IDD) Head, Dr. Kevin Porter; Operational and Undersea Medicine Directorate (OUMD) Head,

Dr. Stephen Ahlers; and, Biological Defense Research Directorate (BDRD) Deputy, Cmdr. Guillermo Pimentel.

During the tour the delegates had the opportunity to view the setup of an NMRC mobile laboratory. Back in October 2014 two NMRC mobile lab teams deployed to Liberia assisting in Operation United Assistance, the global effort to combat the West African Ebola epidemic.

Pimentel, along with his supporting researchers and staff members, displayed the setup of a mobile laboratory. The delegates were shown each aspect of the mobile lab and given a brief synopsis of the work the mobile laboratory teams performed in Liberia.

Next, the delegates were escorted by Porter into the insectary, which is

shared by Navy and Army, to receive an overview of NMRC efforts in battling infections such as Malaria and Dengue Fever. There were also in-depth discussions on the research efforts of combating things such as traveler's diarrhea, scrub typhus, wound infections.

The tour concluded with a visit to the hyperbaric chambers and blast tube area. In the blast tube area, they were able to see a demonstration.

NMRC is headquarters to the R&D enterprise. Its mission is to conduct health and medical research, development, testing, evaluation, and surveillance to enhance deployment readiness of DoD personnel worldwide.

# NMRC's Bone Marrow Research Directorate Uses Robots

Story by Doris Ryan, Naval Medical Research Center Public Affairs



Robot in the process of delivering precise amounts of reagents to each well of the 96 well test plate at the Naval Medical Research Center's (NMRC) Bone Marrow Directorate. (Photo taken by Dr. Robert Hartzman, Naval Medical Research Center)

SILVER SPRING, Md. - Automated technologies are well established in biomedical research and the robots working at the Naval Medical Research Center's (NMRC) Bone Marrow Directorate have an important role in saving lives.

The robots do the rote and repetitive part of identifying the human leukocyte antigen (HLA) gene type used in determining the best match for a bone marrow transplant between a donor and patient.

A bone marrow transplant is a procedure to replace damaged or destroyed bone marrow with healthy bone marrow stem cells. Bone marrow is the soft-fatty tissue inside bones that contains hematopoietic stem cell and the complex biology that produces the four million blood cells per second essential to life. The best bone marrow transplants happen when a patient's HLA and the HLA of the donor closely match.

This is much more complex than matching

blood types. HLA is a protein found on most cells in the body. The immune system uses HLA proteins to control essential parts of the immune system and know which cells belong in the body and which do not. There are huge numbers of variations of the HLA genes that make a person's tissue type nearly unique, identical to one quarter of their siblings and a tiny fraction of others somewhere in the world.

"The processes have always been automated here in the lab, but the type and sophistication of automation has changed radically over time. All processes are performed by scientists and technologists using robots," said Dr. Robert Hartzman, head of the NMRC Bone Marrow Directorate (BMD) and the Navy's C.W. Bill Young Marrow Donor Recruitment and Research Program. "Currently, there are more than 20 major robotic systems and all of the lab equipment has robotic components. The robots perform much of the precision work to look for HLA

genetic types that are obtained from the chromosomal DNA [deoxyribonucleic acid]. This takes about two days and the samples are tested in batches of hundreds. The research on genetic matching continues and this includes the new generation of DNA sequencing technology, and genetic characterization of additional genes important in hematopoietic transplantation."

Hartzman pointed out that the robots perform precise handling of tens of thousands of samples to generate data for a precise HLA gene type.

BMD participates in about 100 DoD marrow donor drives annually. The lab provides all supplies and performs the HLA typing and registers each donor in the National Marrow Donor Program. The drives are sponsored by the local command or ship. For example last year's Donor Drive

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# NMRC Sailor of the Year Award Recognition

Story by Mikelle D. Smith, Naval Medical Research Center Public Affairs



Hospital Corpsman 1st Class Mark Salvador, Naval Medical Research Center Sailor of the Year. (Photo taken by Mikelle D. Smith, Naval Medical Research Center Public Affairs)

SILVER SPRING, Md. – Naval Medical Research Center (NMRC) selected Hospital Corpsman 1st Class Mark Salvador as the 2014 Sailor of the Year (SOY).

"I feel honored to be NMRC's Sailor of the Year ... it is such a huge accomplishment,"

said Hospital Corpsman First Class Mark Salvador. "NMRC has given me a lot of opportunities to grow as a leader and a lab tech. Having a very supportive chain of command and a positive command climate has been a blessing."

As Leading Petty Officer at NMRC's Biological Defense Research Directorate (BDRD), Salvador is charged with overseeing five enlisted Sailors in the Operations department. He personally trains each of them in the function of one of NMRC's most valued components, the mobile labs. In 2014 two mobile lab teams were deployed to Liberia aiding in the West African Ebola epidemic.

"Contributing to the mission when we deployed two mobile labs to Liberia for Operation United Assistance [OUA] taught me a lot," said Salvador. "I learned a lot as the deployment and logistics coordinator for OUA and it gave me a sense of pride and accomplishment that we were able to help Liberians in West Africa by providing rapid Ebola detection capabilities."

SOY candidates encompass a variety of character traits including, but not limited to superior performance, command impact, mission contribution and proven leadership.

"I want to thank my Chiefs: HMC Diederich, HMC Bauer and HMC Espino for providing me with excellent mentorship" said Salvador. "I'd also like to thank Cmdr. Pimentel, HMCS (Retired) Richard Gotautas, Lt. Cmdr. Espinosa and Lt. McCoy for believing in my abilities as a leader and trusting me to 'keep the ship afloat' during their absence."

SOY was started by the Chief of Naval Operations in the early 1970s. Initially, the program's mission was to recognize one Sailor who best represented Navy professionalism and personal dedication; however, in 1973 those requirements were expanded to give all commands Navy-wide the opportunity to praise Sailors exhibiting the Navy core values of honor, courage and commitment.



(Graphic Illustration by Mikelle D. Smith, Naval Medical Research Center Public Affairs)

## NAMRU-3 Senior Research Advisor Retires

(continued from page 4)

NAMRU-3 and the Ministry of Health. In 1999, as the Deputy Director of the Research Sciences Directorate, he redirected NAMRU-3's efforts toward emerging and reemerging infectious disease surveillance, host country capacity building, and outbreak investigations through a major multimillion dollar grant from USAID.

In 2005, he was appointed as the Research Science Director directing and coordinating research conducted by its four major science programs.

He also served as the coordinator and reporting official for the Global Emerging Infections System and the Department of State Biological Engagement Program at NAMRU-3. He efficiently managed a budget of 20 million dollars, directing the research initiatives of more than 50 scientists, epidemiologists, and laboratory technicians throughout Egypt and the region. He also

directed NAMRU-3 activities as a WHO Collaborating Center for Emerging and Reemerging Infections and served on the Egyptian Supreme Inter-Ministerial Committee for the Combat of Avian and Pandemic Influenza in Egypt.

From 1993 to 2005 he served as Visiting Professor in the Department of Preventive Medicine and Biometrics at the Uniformed Services University for the Health Sciences in Bethesda, Maryland.

In 2011 he became NAMRU-3's Senior Research Science Advisor, acting as liaison with U.S. funding partners and providing invaluable insights into the regional and host country's public health activities. Mansour has more than 80 peer-reviewed publications in the field of infectious disease research and more than 60 abstracts and presentations at international meetings and conferences.

In 1990, the Egyptian Academy for Scientific

Research and Technology awarded Mansour the "State Award" as the best basic medical scientist in Egypt. This was followed in 1996 by Egyptian President Mohamed Hosni Mubarak bestowing the Medal of Honor with Distinction (First Class) for Excellence in Medical Science Research.

In 2010 the American University in Cairo selected him to receive their Distinguished Alumni Award as a tribute to his career accomplishments and contributions to the scientific community in Egypt.

"As I reach the end of my career, I am proud to be an American-Egyptian who contributed both to Navy medical research and the public health of my country of birth," said Mansour.

## NMRC's Bone Marrow Research Directorate Uses Robots

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at the Naval Academy had nearly 2,000 volunteers.

Last year there were 45,000 volunteers DoD-wide. That means the lab types, on average 3,750 volunteers per month and each volunteer provides four swabs totaling 15,000 swabs a month that robots process.

"The robots do not make mistakes labeling and tracking each sample, which is not possible in large numbers of samples processed by people," said Hartzman. "The data is analyzed in our lab and transmitted securely to the National Marrow Donor Program. The National Marrow Donor Program has more than 12 million potential donors listed. About 850,000 of those potential donors are registered through the DoD program."

Additionally, Hartzman added that each year approximately 500 of the DoD volunteers provide bone marrow or

hematopoietic stem cells (contained in peripheral blood) provide the best opportunity to save a stranger with a life threatening disease.

The BMD also provides expertise to DoD, the Department of Homeland Security and the Department of Health and Human Services (Assistant Secretary for Preparedness and Response), to develop medical countermeasures to supporting potential casualties with injuries caused by ionizing radiation.

"BMD works extremely closely with all of the other federal programs that support research and clinical hematopoietic transplantation," said Hartzman. "They include the National Heart Lung and Blood Institute, National Cancer Institute, National Institute of Allergy and Infectious Disease, National Institutes of Health Clinical Center, Food and Drug Administration, Center for Disease Control and Prevention, and Veterans Administration," said Hartzman.

For more than 45 years, Navy scientists have focused their research on the set of genes that influence whether an organ transplant is accepted or rejected, (especially bone marrow) making many of the important discoveries. The Navy is responsible for the transition of large scale donor registry HLA typing from low precision immune based testing to precise identification of the HLA gene DNA sequence extracted from each donor's chromosomes.

"NMRC's C.W. Bill Young Marrow Donor Program is a prime example of the Navy's innovative research and how it has far-reaching effects," said Hartzman. "What started as clinical research to explore the idea of viable versus non-viable organ transplants has spawned a national registry of bone marrow donor candidates, giving the gift of life to service members and civilians."



# Lab in Egypt Provides Training on Sand flies

Story courtesy of NAMRU-3 Public Affairs



Naval Medical Research Unit No. 3 (NAMRU-3) is hosting Mr. Nabil Mogalli, for training on sand fly identification and microscopy. Mogalli is a lecturer at El Hajja University in northwest Yemen and completing his doctorate in Cairo. (Photo courtesy of NAMRU-3 Public Affairs)

CAIRO – The U.S. Naval Medical Research Unit No. 3 (NAMRU-3) is hosting Mr. Nabil Mogalli, for training on sand fly identification and microscopy. Mogalli is a lecturer at El Hajja University in northwest Yemen and completing his doctorate in Cairo.

Mogalli, a Yemeni zoologist, is completing his doctorate at Ain Shams University in Cairo.

NAMRU-3 Vector Biology Research Program's (VBRP) Dr. Shaaban El Shoubary, a professor at Ain Shams University and NAMRU-3 contractor, suggested the university request training at NAMRU-3 in conjunction with Mogalli's doctoral studies.

Mogalli's field of research is visceral leishmania, which is carried by sand flies. This disease is common

in northwest Yemen, and Mogalli brought slide smears of *Leishmania tropica* and sand fly samples.

While Mogalli's earlier studies did not required practical microscopy work, it is required for his current studies.

During his training he learned sand fly identification and all steps involved in mounting sand flies. Mogalli worked closely with El Shoubary to identify over 1300 sand flies.

In addition, VBRP's laboratory technicians sequenced the slide smears of *Leishmania tropica* Mogalli has taken from both lesions and sera of infected Yemeni citizens, collected while working as a volunteer for the NGO Regional Leishmaniasis Control Center in northwest Yemen. This center provides free treatment for Leishmania.

The positive samples were tested by a type of PCR called RFLP for species detection; and *L. tropica* was detected in all positive samples.

Mogalli is studying the relationship between the antibodies and reactive antigens in the same patients.

As a result of his training, Mogalli has drafted two manuscripts in collaboration with NAMRU-3. His hope is to continue collaboration with NAMRU-3 on *Leishmania* research and capacity building for his university. Ideally he would like to be able to send samples to NAMRU-3 for analysis and establish a research site in northwestern Yemen where sand flies are endemic.

## Navy Lab Provides Training at Egyptian Ministry of Health Lab

Story courtesy of NAMRU-3 Public Affairs



NAMRU-3's Mary Younan with Egyptian Central Public Health lab trainees. (Photo courtesy of CPHL.)

CAIRO – The U.S. Naval Medical Research Center No. 3's (NAMRU-3) Viral and Zoonotic Diseases Research Program (VZDRP) conducted training on sequencing of seasonal influenza viruses in late October 2014, at the Egyptian Ministry of Health Central Public Health Laboratory (CPHL).

This training supported the Influenza-like Illness surveillance project in Egypt funded by Global Emerging Infectious Surveillance and Response System (GEIS).

GEIS, a division of the Armed Forces Health Surveillance Center, promotes and facilitates national and international preparedness for emerging infections.

The training provides the capacity for the CPHL to sequence influenza viruses, which is critical in its role as the National Influenza Center laboratory for Egypt.

Ms. Mary Younan, a medical research technologist in the VZDRP Genomics Unit, conducted lectures on molecular

markers of resistance to antiviral drugs in influenza, as well as sequencing concepts and methods for the CPHL staff including Dr. Amel Naguib, CPHL Molecular Biology Laboratory Head and several technicians.

"I helped them understand the process starting with science basics, workflow, proper setting of sequencing machine, evaluation of the quality of their sequences and then how to contact the company to get the required software they need for the analysis of the sequencing outcome," said Younan.

Naguib commented that Younan was able to simplify the information and explain the materials for even those who had no previous background in sequencing.

Younan, who has extensive training experience in the Eastern Mediterranean region, Central Asia and West Africa, was impressed by the management of the lab and the quality of the team.

"When we conduct training for the [Egyptian] Ministry of Health, we realize that this initiates a relationship that we will maintain," said Younan. "[We must] be sure that their staff can accomplish the sequencing. NAMRU-3 also continues to play a role in assisting with data analysis."

Five categories of infectious diseases and associated clinical states are GEIS priority surveillance pillars. They are respiratory infections (especially influenza), gastrointestinal infections, febrile illness syndromes (especially dengue and malaria), antimicrobial resistance and sexually transmitted infections.

GEIS promotes, expands and executes strategic goals of surveillance and detection, response and readiness, integration and innovation, and cooperation and capacity building.



## NMRC IDD Directorate Hold Seminar with AAHL Guest Speakers

Story by Ensign Christian Bergman



*Dr. John Lowenthal and Dr. Glenn Marsh, representatives of the Emerging Infectious Diseases Program under the Biosecurity Flagship of the Commonwealth Scientific and Industry Research Organization (CSIRO), visited the NMRC to highlight the capabilities of their unique BSL-4 lab and research facilities at the Australian Animal Health Laboratory (AAHL). (Photo taken by Mikelle D. Smith, Naval Medical Research Center Public Affairs)*

SILVER SPRING, Md. -- Dr. John Lowenthal and Dr. Glenn Marsh, representatives of the Emerging Infectious Diseases Program under the Biosecurity Flagship of the Commonwealth Scientific and Industry Research Organization (CSIRO) in Australia, visited Naval Medical Research Center (NMRC) to highlight capabilities of a unique BSL-4 lab; and, the research facilities at the Australian Animal Health Laboratory (AAHL).

The AAHL facility is one of the largest in the world and the only BSL-4 laboratory in the Southern hemisphere. This extremely modern facility was designed to facilitate research in animals of all sizes including mice, bats, ferrets and horses.

This translates to a unique capability to utilize large domestic animals or large numbers of smaller animals for research use under stringent conditions.

Marsh specifically addressed the recent development of a new ferret model for the ebola virus. Additionally, he highlighted the special interest that AAHL has in examining bats as transmitters of zoonotic diseases.

Dr. Lowenthal emphasized his idea of “a sort of ‘SWAT team’ for newly-emerging infectious diseases.

“The imagery evoked the idea of a quick reaction collaborative force,” said Lowenthal. “Scientists and clinicians from the U.S., Australia and other allies around the globe working together

to swiftly produce therapeutics and vaccines, and facilitate rapid approval and deployment.”

AAHL would be able to provide the bandwidth, space and know-how to evaluate and produce animal models that accurately mimic human disease, and models for potential treatment modalities.

Lowenthal hopes to establish collaborative efforts in a variety of infectious diseases, including MERS-CoV, ebola, avian influenza and antimicrobial-resistant bacteria, with partner U.S. facilities, starting with NMRC.

## R&D Chronicles

# Navy Medicine and the Eradication of the Tetanus Menace

By Andre B. Sobosinski, Historian, Bureau of Medicine and Surgery

*Before the advent of tetanus antitoxin, “lock-jaw” attacked many of the wounded and killed almost all of its victims. Antitoxin prophylaxis and treatment improved the situation but, in spite of the best possible use of antitoxic serum, tetanus still occurred, and those who developed the infection, the mortality remained high.*

~Capt. W.W. Hall, MC, USN, January 1937

Even before the days of Hippocrates tetanus was a well-known and grisly disease recognized as producing muscle spasms, muscular rigidity (e.g., lock-jaw), seizures, broken bones and even death. Caused by the anaerobic bacterium *C. tetani* that thrives in soil, rusty metal and manure, it is transmitted through simple cuts, scrapes and puncture wounds. The disease can take as little as days to manifest and can kill up to 30 percent of its victims.

Thanks to immunization (and a booster shot taken every 10 years) the tetanus horror of yesteryear has been wiped from our collective memories. Nevertheless, for those in the Armed Forces there is no denying the disease once proved a real problem.

On the battlefields of France and Belgium in World War I, contracting tetanus could be a death sentence. One source cites that 80 to 90 percent of tetanus victims in the Great War died. Typically, the soldier was inoculated with an antitoxin only after suffering an injury and already infected with the disease. The antitoxin provided a very limited “passive immunity” against the disease.

In the 1920s, Louis Bazy and George Ramon of the Pasteur Institute developed a tetanus toxoid that would stimulate the body’s ability to make antitoxins for immunizing (i.e., “active immunization”). Many of the early toxoid studies were continued in the United States in the 1930s; beginning in June 1934, the U.S. Navy pioneered the largest experimental tetanus toxoid study ever conducted on a control population.

Led by researcher Lt. Cmdr. (later Capt.) W.W. Hall, (and taking place aboard the hospital ship *USS Relief* [AH-1]), the Navy study looked at the proper intervals between injections, as well as, the required number of injections for successful immunization with an alum-precipitated toxoid.

The study offered promising results and showed that the body’s resistance to the disease was greater than the “natural or artificial introduction of an antigen.” Soon after, Hall was dispatched to the Naval Academy in Annapolis, Maryland, to test the toxoid injections on a larger population of volunteers.



*Tetanus and yellow fever shots being given to men aboard USS Nevada en route to Iwo Jima, February 1945. (Photo courtesy of BUMED Archives)*

In 1938 Hall, (in conjunction with Capt. Reynolds Hayden, commanding officer of Naval Hospital Annapolis), inoculated the entire student body at the Naval Academy (2,300 midshipmen) with an alum-precipitated tetanus toxoid. The researchers found that although the toxoid provided immunity it also yielded too many reactions. Researchers determined it was necessary for future batches of tetanus toxoid be tested to ensure safety and effectiveness.

In 1941 (partly due to the success of the *USS Relief* and the Annapolis trials), the Bureau of Medicine and Surgery instituted a program of immunizing all Navy and Marine personnel against tetanus with the alum-precipitated toxoid. Originally, consisting of three doses of 1 cc each administered subcutaneously with an interval of three weeks between injections, in August of that year the course of immunization was changed to two injections of .5 ½ cc of alum-precipitated tetanus toxoid within an interval of between four and eight weeks. A year later a “booster” injection of .5 ½ cc would be given. After the second dose was administered the identification tag (“dog tag”) would be die-stamped with a capital “T” followed by the month and last two digits of the year of immunization.

Due to the research and practice of immunization not one American serviceman or woman would die of the disease in



# “Be someone’s Hero” — Eliminate Sexual Assault: Know Your Part. Do Your Part.

By Vice Adm. Matthew L. Nathan, Navy surgeon general and chief, U.S. Navy Bureau of Medicine and Surgery



FALLS CHURCH, Va. - April marks Sexual Assault Awareness and Prevention Month and I take this issue very seriously. That means I have a zero tolerance policy when it comes to sexual assault and I expect the same from everyone – Sailor or Civilian – throughout the entire Navy Medicine enterprise.

Increasing awareness and preventing sexual assault is a priority all year round, but as April begins, I also want to emphasize the important role Navy Medicine plays in preventing these crimes and the care we provide when these incidents occur that can tarnish our Navy, a career, and lives.

In order to eliminate sexual assault from our service, every Sailor must know, understand and adhere to standards of behavior. When we join the Navy, we join a professional organization and pledge to uphold the core values of honor, courage and commitment.

I’m counting on you to live by those tenets. Recognize your role in sexual assault prevention and know when, where, and how to intervene. Be an intrusive leader. Is it awkward at times to step in and “stop the fun” when it goes too far? Be someone’s hero. Be that Sailor who has the courage and pride to intrude, to protect someone from another or perhaps themselves. Your actions could

change the trajectory of someone’s life from misery to success.

I am distraught any time I hear of a sexual assault within our ranks. It is inconceivable to me that our shipmates would assault one another or anyone else. These are the same comrades who entrust their lives to one another at sea, on the battlefield and in the workplace. Sexual assault destroys trust, it erodes morale among shipmates, and it degrades our mission readiness and operational effectiveness. The bottom line is sexual assault is a crime and will not be tolerated.

This year’s theme for Sexual Assault Awareness and Prevention Month is “Eliminate Sexual Assault: Know Your Part. Do Your Part.”

Sexual assault prevention requires each of us to actively participate and stay engaged in the lives of our shipmates and colleagues. If you see a shipmate who is harassing someone or being harassed, exert your leadership, demonstrate the Navy’s core values and take action – in other words, do your part. We must take care of one another because the safety, dignity, and well-being of our Sailors and Marines is a responsibility we all share.

Navy Medicine directly supports sexual assault awareness and prevention programs, not only through our training and education efforts, but also by ensuring the availability of care for those who have been victimized.

We have proficient, confident and caring Sexual Assault Forensic Examination (SAFE) providers ready 24 hours a day, seven days a week to meet the immediate and long-term medical needs of sexual assault victims.

SAFE providers – including sexual assault nurse examiners, physicians, physician assistants, advanced practice nurse practitioners and independent duty corpsmen – are trained and available to ensure timely and appropriate medical care for sexual assault victims in all military platforms served by Navy Medicine. We currently have more than 875 SAFE-trained providers serving aboard ships, alongside Marines, and in treatment facilities.

I expect everyone at every level, regardless of your rank, role or position, in Navy Medicine to be engaged. Together, by knowing our part and doing our part, we can eliminate sexual assault from our Navy.

Thank you for your service.

# Navy Researcher at NSMRL Received Audiology Awards

Story courtesy of NSMRL Public Affairs

GROTON, Conn. - Dr. Jeremy Federman of the Naval Submarine Medical Research Laboratory (NSMRL) received the Navy Civilian Audiologist of the Year 2014 Award and the Military Audiologist Association (MAA) Research Award during the annual Joint DoD/VA Audiology Conference, March 2015.

“During Dr. Federman’s two year tenure at NSMRL in Groton, he hit the ground running”, said Lt. Cmdr. Chris Duhon of Navy Hospital Beaufort/USMC MCRD, Parris Island. “Dr. Federman has accomplished an amazing number of tasks that have required not only professional and social expertise, but the ability to integrate theoretical scientific principles, pragmatic concerns; clear communication skills [and] realistic management skills.”

Federman was a key player in recommending hearing protection device selection, verification and training across the Navy and Marine Corps and evaluating the viability of hearing protection device fit testing of all training recruits at Navy and Marine accession points.

“Dr. Federman has demonstrated both tenacity and persistence in getting the job done despite being challenged with limited staffing and funds,” said Duhon. “He has become a vital member of the Navy Audiology Community and continues to selflessly contribute to our profession by volunteering his time.”

Federman completed the first phase of data collection on hearing protection device personal attenuation rating and briefed the Hearing Conservation and Noise Abatement Flag Level Steering Board and initiated planning of the



*Navy's Audiology Specialty Leader, Lt. Cmdr. Michelle Kee presenting the Military Auditory Association's Research Award and the Navy Civilian Audiologist of the Year to Dr. Jeremy Federman. (Photo courtesy of NSMRL Public Affairs)*

next phase of the project based on first phase results.

Federman was noted for many other achievements during 2014 including advising Navy audiology leadership on multiple hearing conservation matters including the deployment of complex electronic hearing protection devices to individuals with high risk for noise-induced hearing loss; the clinical use of new diagnostic equipment; the use of communication devices in CV22 and F22 aircraft; input on 10-year data regarding measures of effectiveness related to hearing loss rates across the DoD; determining adequate protection for 30 Hour C-130 training exercises, and participating as a member of the DoD Auditory Fitness for Duty Working Group.

He has reached out to other military service branches and is collaborating with the U.S. Army's Research Lab at Fort Rucker, Alabama; the Air Force Research Lab at Wright Patterson Air Force Base, Ohio; and the National Institute for Occupational Safety and Health, Cincinnati, Ohio.

This collaboration is part of ongoing DoD work related to hearing protection devices and blast exposures, methods and equipment for fit testing of hearing protection devices, and the development of new research proposals.



# NAMRU-Dayton Lab Continues to Investigate Hypoxia Mitigation

Story by Dr. Jeffrey Phillips, NAMRU-Dayton

DAYTON, Ohio - Naval Medical Research Unit - Dayton's (NAMRU-D) hypoxia laboratory focuses on quantifying the performance effects of hypoxia and identifying emerging technologies to provide fail-safe hypoxia mitigation.

The hypoxia lab is staffed with experimental psychologists, physiologists, and biomedical engineers. NAMRU-D investigators have executed numerous studies evaluating off-the-shelf biomedical sensors for the ability to reliably detect an impending hypoxic threat before the operator experiences significant performance degradation. Technologies evaluated include near infrared spectroscopy, pulse oximetry, reflectance pulse oximetry, eye tracking, and pupilometry.

Both the Air Force and Navy are developing in-mask gas sensor suites to provide warnings to aviators when a life support malfunction occurs. Unfortunately, most commercial gas sensors do not perform well in tactical aviation environments due to the large variations in barometric pressure, humidity, and temperature. NAMRU-D houses a state-of-the-art gas sensor testing facility which allows gas and chemical sensors to be evaluated in conditions equivalent to the flight environment.

Sensors are tested in a hypobaric chamber while pressure, humidity and temperature are manipulated. To date, twenty-two sensors have been evaluated. The testing has verified that sensor sensitivity and specificity improvements are required before they can reliably provide significant hypoxia mitigation in-flight.

The NAMRU-D hypoxia team conducted multiple studies to model the onset of hypoxia performance effects as well as the recovery of performance following hypoxia exposure.

Breaking with traditional teaching, NAMRU-D study results suggest operators exposed to hypoxic environments experience significant performance degradation at a much earlier time point than predicted by the Time of Useful Consciousness Tables



*Small hypobaric environmental chamber for sensor testing in aviation-relevant environmental conditions. The chamber can vary pressure, temperature, humidity, and airflow on sensors of interest. (Photo courtesy of NAMRU-Dayton Public Affairs)*

customarily used for risk assessments.

Previously unappreciated subtle performance effects have been found to persist for hours following exposure. The most recent study also found empirical evidence of an oxygen paradox as subjects experienced the largest performance deficits while they were being administered a five minute treatment with 100 percent oxygen following hypoxia exposure.

This implies that following hypoxia exposure, operators could remain significantly impaired throughout the remainder of the flight.

In the coming years, the NAMRU-D hypoxia lab will continue to conduct experiments to better understand the performance effects of

hypoxia, to test hypoxia-mitigation sensors for their ability to perform in the tactical flight environment, and to identify a hypoxia recovery gas mixture that will provide quick recovery from hypoxia exposure without further compromising performance.

NAMRU-D is co-located with the Air Force's 711<sup>th</sup> Human Performance Wing at Wright-Patterson Air Force Base which facilitates direct collaboration and allows researchers to leverage their extensive research capabilities. As a result, NAMRU-D is the one-stop research lab for answering aeromedical and environmental health scientific questions.

## “It’s On Us” - NAMRU San Antonio Women Fight Sexual Assault with Self-Defense Skills

Story by Ms. Flisa Stevenson, NAMRU San Antonio Public Affairs

SAN ANTONIO – Women staff from the Naval Medical Research Unit San Antonio (NAMRU-SA) embrace the theme “Eliminate Sexual Assault: Know Your Part, Do Your Part!” They were taught Krav Maga strategies to protect and defend themselves in an attack or abduction situation, during the annual “Dangerously Cute” self-defense seminar benefiting the local Rape Crisis Center, February 7, 2015.

The command’s Sexual Assault Prevention and Response (SAPR) coordinator Melanie Friesenhahn, organizes the command’s participation in the women’s only event each year with one goal --preventing and responding to sexual assault.

More than 200 women from the San Antonio area attended the personal protection training event and were taught a variety of Krav Maga defense techniques to ward off attackers or potential abductors.

For some NAMRU-SA women, this is their second training event. They

returned this year to strengthen the skills they first learned last August.

Friesenhahn said, “Repeating the seminar each year helps women stay strong, confident, and safe by raising awareness about sexual assault and by providing a ‘real-life’ self-defense skill to help women fight sexual assault.”

Krav Maga, which means ‘contact combat’ in Hebrew, is a self-defense system developed for the military in Israel that focuses on neutralizing aggression and threat with a wide combination of effective and efficient counter-attack techniques.

Krav Maga also strives for maximum versatility because you actually defend and attack simultaneously to quickly get yourself out of danger.

The workshop instructor informed participants to first be aware of their surroundings and be prepared to react effectively. Before the workshop ended, each woman had the opportunity to test her response skills.

One at a time participants were brought to the middle of the floor, and asked to close their eyes to simulate the disadvantaged position of not knowing they would be “attacked.”

At the sound of the instructor’s whistle, a male trainer dressed in padding attempted to either pick up and abduct the woman from behind or attack and choke her from the front.

All who participated used their new skills efficiently and effectively, and walked away from the training confident and empowered.

Navy’s goal is to eliminate sexual assault by fostering a culture of prevention. The next SAPR events NAMRU-SA intends to participate in will be the “Drive Out Sexual Assault” Golf Tournament, April 17, 2015 and ‘Eliminate Sexual Assault: Know Your Part, Do Your Part!’ 5K Run/Walk, April 25, 2015.





# NMRC-Asia Sailor Selected as SOQ by Navy Region Singapore

Story by Doris Ryan, Naval Medical Research Center Public Affairs



HM1 (FMF) Harold Sylvester, assigned to NMRC-Asia, received the Sailor of the Quarter award from Rear Adm. Charlie Williams, COMLOGWESTPAC. (Photo courtesy of NMRC-Asia Public Affairs)

SILVER SPRING, Md. – The leading petty officer at the Naval Medical Research Center – Asia (NMRC-A) was selected as the Sailor of the Quarter, First Quarter, 2015, by Navy Region Singapore. HM1 (FMF) Harold D. Sylvester received his award from Rear Adm. Charlie Williams, COMLOGWESTPAC, March 19.

“We are certainly proud of HM1 Sylvester and all he does for the command and the community,” said Capt. Marshall Monteville, commanding officer NMRC-Asia. “The fact that he was selected from a pool of nominees that included representation from Navy Regional Singapore, COMLOGWESTPAC and several other tenant commands here in Singapore is a testament to the quality of Sailors we have.”

Sylvester, from Chicago, Illinois, was

recognized for his significant contributions to the overall mission of NMRC-A.

As an example he led a team supporting fifteen infectious disease projects, one that included the first mosquito larvae surveillance program in the Sembawang community. Sylvester also works with the host nation, Duke-National University, University of Malay and NMRC-A to manage training exchanges emphasizing emerging infectious diseases and prevention.

Sylvester’s unswerving determination, wise judgment, and complete dedication to duty reflects credit on himself and in keeping with the highest traditions of the Navy.

“I am deeply humbled,” said Sylvester. “I do know there are a lot of people who seem to be in my corner, that’s, of course,

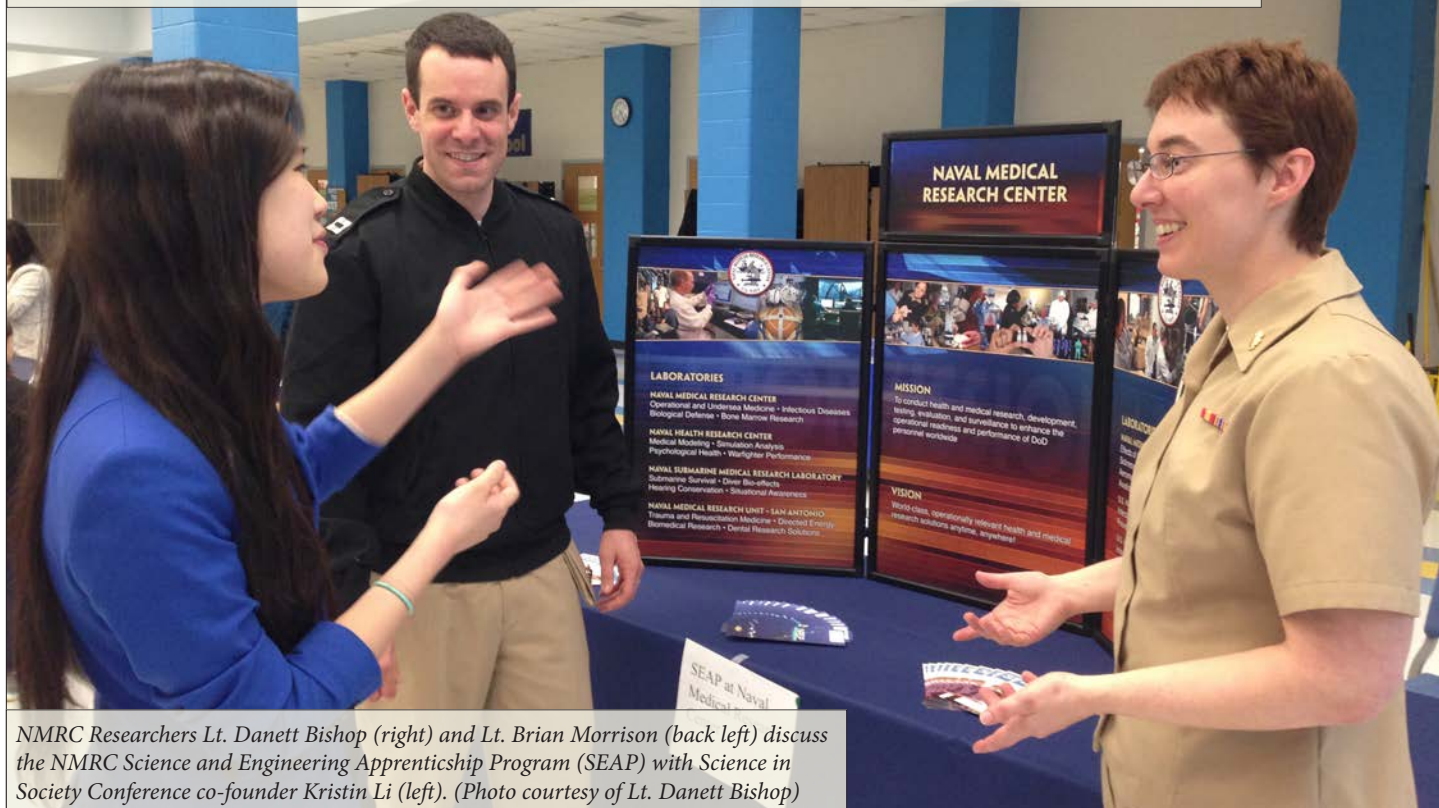
wonderful. It is such an honor just to be nominated; the nomination puts you within a group of outstanding Sailors.”

The mission of NMRC-A is to identify infectious disease threats of military and public health importance and develop and evaluate interventions and products to mitigate those threats. NMRC-A supports U.S. interests in the Pacific Theater.

NMRC-A advances diplomacy in the region by conducting infectious disease research and improving surveillance, and outbreak response assistance for critical public health importance to the United States and regional partners.

# NMRC Researchers Participate in Local High School Science Fair

Story by Mikelle D. Smith, Naval Medical Research Center Public Affairs



NMRC Researchers Lt. Danett Bishop (right) and Lt. Brian Morrison (back left) discuss the NMRC Science and Engineering Apprenticeship Program (SEAP) with Science in Society Conference co-founder Kristin Li (left). (Photo courtesy of Lt. Danett Bishop)

SILVER SPRING, Md. -- Scientists at the Naval Medical Research Center (NMRC) log significant hours searching for the next huge breakthroughs in research and development. Among the plethora of tasks they engage in daily, time is still given to local communities and future innovators of science through volunteering – recently, three researchers took time to do just that.

Lt. Danett Bishop, Lt. Kimberly Edgel and Lt. Brian Morrison, were invited to River Hill High School's Science in Society Conference, Clarksville, Maryland, March 23. The event was coordinated by high school senior and co-founder of Science in Society Kristin Li.

"The idea first came to us back in October of 2014," said Li. "Our conference has a two-fold objective; we want to encourage more students to pursue STEM [Science, Technology, Engineering and Mathematics]-based careers in the future by getting involved in those opportunities now and we want to broaden students horizons to career opportunities a science-based education

[could provide] in business, public policy, research and finally medicine."

The conference explored the role of science in business, environment, public policy, history, education and engineering and space. Bishop, Edgel and Morrison set up a booth highlighting NMRC's yearly involvement in the STEM program and the Science and Engineering Apprenticeship Program (SEAP) through the summer months.

"Ms. Li did an amazing job organizing this well-attended event," said Bishop. "Students were very curious and engaged, wanting to know what different kinds of opportunities were available through the SEAP program and several of them had heard of it [the SEAP program] previously or were in the process of applying."

SEAP provides opportunities for students to participate in research at Department of Navy (DoN) laboratories in summer. SEAPs goals include encouraging participating students to pursue science and engineering

careers and to further their education via mentoring by laboratory personnel and their participation in research.

"NMRC SEAP mentors know the value of exposing high school students to the military research environment as these students will eventually become our future scientific leaders," said NMRC SEAP Coordinator Lt. Kimberley Edgel. "The research the students conduct today will have a profound impact on their future career goals."

"We heard about the SEAP program from several of our friends who had applied previously," said Li. "After doing research, we realized that SEAP would be perfect to invite because the program aims at encouraging more students to pursue STEM careers and has an interesting focus on technology and engineering in addition to research."

If you would like an NMRC researcher to participate in a local volunteer event, please contact the Public Affairs Office at 301-319-9378 or 301-319-9425.



# Researcher Inducted into Texas A&M Academy of Distinguished Former Students

*Story courtesy of Texas A&M University Press Release (edited)*

COLLEGE STATION - Dr. Ketan S. Patel, class of 1996, and two other alumni from Texas A&M College of Science were selected by the college for its highest alumni honor, induction into its Academy of Distinguished Former Students. Patel joins a prestigious list of 48 previous honorees distinguished for their merit and innovative achievements.

Patel received a bachelor of science in biochemistry in 1996 and his Ph.D. in biology in 2006 from Texas A&M. A respected leader in plant biology and the biodefense sector, he currently serves as a Naval Medical Research Center (NMRC) subject matter expert and lead trainer for diagnostic and capacity building in the Former Soviet Union, Africa and the Middle East.

Last fall, he assisted in mobilizing and setting up the first U.S. Navy mobile lab to help combat the Ebola outbreak in West Africa. As a member of the first team deployed into Liberia, he established important relationships with doctors and healthcare workers on the front lines of the global crisis as well as protocols to process blood samples containing the Ebola virus, improving treatment and ensuring both safe and faster diagnosis.

Patel's pioneering career started in the academic sector as graduate research assistant studying plant biology in the Texas A&M Department of Biology. Later, he shifted to the DoD as a contractor when he joined the Armed Forces Institute of Pathology (AFIP) in 2006 as branch chief of the molecular and genomics department.

After his time at AFIP, he was hired as a postdoctoral researcher at the newly constructed North Carolina



*Henry M. Jackson Foundation contractor Dr. Ketan Patel (right) and NMRC Microbiologist Lt. Jose Garcia (left) set up equipment in the island Clinic mobile laboratory. NMRC mobile laboratories are currently deployed to Liberia to aide in the global effort against the West African Ebola epidemic. (Photo courtesy of Dr. Ketan Patel)*

Research Campus in Kannapolis where he helped establish a state-of-the-art, multi-million plant biology laboratory at the Plants for Human Health Institute.

His leadership and experience allowed the lab to quickly start working on problems to elucidate plant responses to abiotic and biotic stress, resulting in five publications in peer-reviewed scientific journals.

He collaborated with colleagues at North Carolina State University to sequence and annotate the genome of blueberry, an important fruit known

for its antioxidant phytochemicals that can help prevent disease and improve health.

The Academy of Distinguished Former Students was established in 1996 to recognize Aggies who have brought honor to their alma mater and professions through outstanding leadership in mathematics, statistics, the sciences and medicine.